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Declaration of Conformity

We

GOOD WILL INSTRUMENT CO., LTD.

No. 95-11, Pao-Chung Rd., Hsin-Tien City, Taipei Hsien, Taiwan

declares that the below mentioned product

PST-3201, PST-3202

are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/366/EEC, 92/31/EEC, 93/68/EEC) and Low Voltage Equipment Directive (73/23/EEC).

For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Equipment Directive, the following standards were applied:

◎ EMC

EN 61326-1: Electrical equipment for measurement, control and laboratory use — EMC requirements **(1997+A1: 1998)**	
Conducted and Radiated Emissions EN 55011: 1991+A1: 1997+A2: 1996	Electrostatic Discharge EN 61000-4-2: 1995
Current Harmonic EN 61000-3-2: 1995+A1: 1998+A2: 1998 +A14: 2000	Radiated Immunity EN 61000-4-3: 1996
Voltage Fluctuation EN 61000-3-3: 1995	Electrical Fast Transients EN 61000-4-4: 1995
----------	Surge Immunity EN 61000-4-5: 1995
----------	Conducted Susceptibility EN 61000-4-6: 1996
----------	Voltage Dips/ Interrupts EN 61000-4-11: 1994

◎ **Safety**

Low Voltage Equipment Directive 73/23/EEC & amended by 93/68/EEC
EN 61010-1: 1993+A2: 1995 IEC 1010-1: 1990+A2: 1995
USA : UL 3111-1 – First Edition, June 1994
Canada: CSA-C22.2 No. 1010.1-92

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PST-3201/3202 PROGRAMMABLE POWER SUPPLY
USER MANUAL

SAFETY TERMS AND SYMBOLS

These terms may appear in this manual or on the product:

WARNING. Warning statements identify condition or practices that could result in injury or loss of life.

CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

The following symbols may appear in this manual or on the product:

DANGER High Voltage

ATTENTION refer to Manual

Protective Conductor Terminal

Earth (ground) Terminal

Frame or Chassis Terminal

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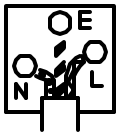
FOR UNITED KINGDOM ONLY

NOTE: This lead/appliance must only be wired by competent persons

WARNING: THIS APPLIANCE MUST BE EARTHED

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/ Yellow:	**Earth**
Blue:	**Neutral**
Brown:	**Live (Phase)**



As the colours of the wires in main leads may not correspond with the colours marking identified in your plug/appliance, proceed as follows:

The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with the letter E or by the earth symbol or coloured Green or Green & Yellow.

The wire which is coloured Blue must be connected to the terminal which is marked with the letter N or coloured Blue or Black.

The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, cable of 0.75mm^2 should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any moulded mains connector that requires removal /replacement must be destroyed by removal of any fuse & fuse carrier and disposed of immediately, as a plug with bared wires is hazardous if a engaged in live socket. Any re-wiring must be carried out in accordance with the information detailed on this label.

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1. PRODUCT INTRODUCTION

1-1.Description

PST-series Programmable Power Supply is controlled by Micro Processor Unit (MPU) that can easily connect communication interface RS-232 or GPIB to computer in order to satisfy users' demand for auto-testing and auto-control.

The voltage and current are completely controlled by 12 bits D/A Converter with higher resolution and accuracy. Also, the digitalization of system makes a speedy, precise and convenient input of information controlled by keyboard.

The adjustment of voltage/current is made by software calibration without manual error that will increase the preciseness of the instrument.

The function of Over Voltage Protection (OVP) and Over Current Protection (OCP) is set with software and detected with hardware to achieve protected function precisely and speedily in order to secure users from danger by using the instrument.

1-2. Feature

1) An overall digitalization of programmable interface with high resolution.
2) The 192×128 LCD Display can appear multiple settings and measurement results simultaneously.(The display mode is changeable).

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3) Intuitional, intelligent interface window display is convenient for user tooperate the instrument.
4) High stability and low draft.
5) The function of over voltage/current/temperature protection.
6) Intelligent control fan (Vary with different output power.)
7) Warning signal by the built-in Buzzer.
8) Step by step calibration procedure.
9) Brand new panel design and the 1/2 rack size reduction volume design.
10) Wheel knob of Fine and Coarse.
11) 100 groups storage space setting.
12) Parallel and series operation modes.
13) IEEE-488.2 and SCPI compatible command setting.
14) 0.1 sec timer for output working loop (Auto step running)
15) Correspond to UL, CSA, CE, and LVD safety regulation.

PST-3201/3202 PROGRAMMABLE POWER SUPPLY
USER MANUAL

2.TECHNICAL SPECIFICATIONS

SPECIFICATIONS		PST-3201	PST-3202
Output	Voltage	0~32V×3	0~32V×2, 0~6V×1
	Current	0~1A ×3	0~2A ×2, 0~5A ×1
	OVP	0~33V×3	0~33V×2, 0~7V×1
Load Effect	Voltage	≦3mV(≦5mV rating current>3.0A)	
	Current	≦3mA(≦5mA rating current>3.0A)	
Source Effect	Voltage	≦3mV	
	Current	≦3mA	
Resolution	Voltage	10mV(20mV rating voltage>36V)	
	Current	1mA(2mA rating current>3.5A)	
	OVP	10mV(20mV rating voltage>36V)	
Program Accuracy (25±5℃)	Voltage	≦0.05%+10mV(+20mV rating voltage>36V)	
	Current	≦0.1%+5mA(+10mA rating voltage>3.5A)	
	OVP	≦0.05%+10mV(+20mV rating voltage>36V)	
Ripple & Noise (20Hz~20MHz)	Voltage	Ripple≦1mVrms/3mVp-p Noise≦2mVrms/30mVp-p	
	Current	≦3mArms(≦5mArmsrating current>3.0A)	
Temperature Coefficient (0~40℃)	Voltage	≦100ppm+3mV	
	Current	≦100ppm+3mA	
Readback Resolution	Voltage	10mV(20mV rating voltage >36V)	
	Current	1mA(2mA rating current >3.0A)	
Response Time Voltage Up Voltage Down	10%~90%	≦100ms	
	90%~10%	≦100ms (≧10% rating load)	
Readback Temperature Coefficient	Voltage	≦100ppm+10mV(+20mV rating voltage>36V)	
	Current	≦150ppm+10mA	
Drift	Voltage	≦100ppm+10mV(+20mV rating voltage>36V)	
	Current	≦150ppm+10mA	

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Track Operation	Tracking Error	≦0.1%+20mV
	Series (Load Effect)	≦20mV
Parallel Operation	Program Accuracy	Voltage≦0.05%+10mV(+20mV rating voltage >36V) Current≦0.1%+10mA OVP≦0.05%+10mV
	Load Effect	Voltage≦3mV(≦5mV rating current>3.0A) Current≦6mA
	Source Effect	Voltage≦3mV Current≦6mA
Memory		Store/Recall points 0~99
Timer	Setting time	0.1sec~99min59sec(max ×100)
	Resolution	0.1sec
	Function	For output working loop (Auto Step running)
Interface	RS232, GPIB interface option	
Power Source	AC100V, 120V, 220V±10%, 230V +10%/-6% 50/60Hz.	
Mechanical Spec.	Dimensions	230(W)×140(H)×380(D) mm.
	Weights	10 kg
Operation Environmental	Indoor use Altitude up to 2000 m Ambient temperature : To satisfy specifications : 10℃ to 35℃ (50° F to 95°F) Maximum operating ranges: 0℃ to 40℃(32°F to 104°F) Relative humidity: 85% RH(max.) non condensing Installation Category : II Pollution degree 2	
Storage Temperature & Humidity	-10° to 70℃, 70%RH (maximum)	
Accessories	Power cord…..…… 1 Instruction manual…… 1 Test Lead…… 3	

3.PRECAUTIONS BEFORE OPERATION

3-1.Unpacking the Instrument

The product has been fully inspected and tested before shipping from the factory. Upon receiving the instrument, please unpack and inspect it to check if there is any damage caused during transportation. If any sign of damage is found, notify the bearer and/or the dealer immediately.

3-2.Checking the Line Voltage

The product can be applied by any kind of line voltages shown in the table below. Before connecting the power plug to an AC line outlet, make sure the voltage selector of the rear panel is set to the correct position corresponding to the line voltage. It might be damaged the instrument by connecting to the wrong AC line voltage.

WARNING. **To avoid electrical shock the power cord protective grounding conductor must be connected to ground.**
AVERISS: Pour éviter les chocs électriques, le fil de terre du cordon secteur doit impérativement être relié à la terre.

When line voltages are changed, replace the required fuses shown as below:

Model	Line voltage	Range	Fuse	Line voltage	Range	Fuse
PST-3201	100V 120V	90-110V 108-132V	T3A 250V	220V 230V	198-242V 216-253V	T1.6A 250V
PST-3202			T5A 250V			2.5A 250V

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WARNING. **To avoid personal injury, disconnect the power cord before removing the fuse holder.**

3-3.Environment

The normal ambient temperature range of this instrument is from 0°to 40℃ (32° to 104°F). To operate the instrument exceeding this specific temperature range may cause damage to the circuits of instrument.

Do not use the instrument in a place where strong magnetic or electric field exists as it may disturb the measurement.

4. PANEL INTRODUCTION

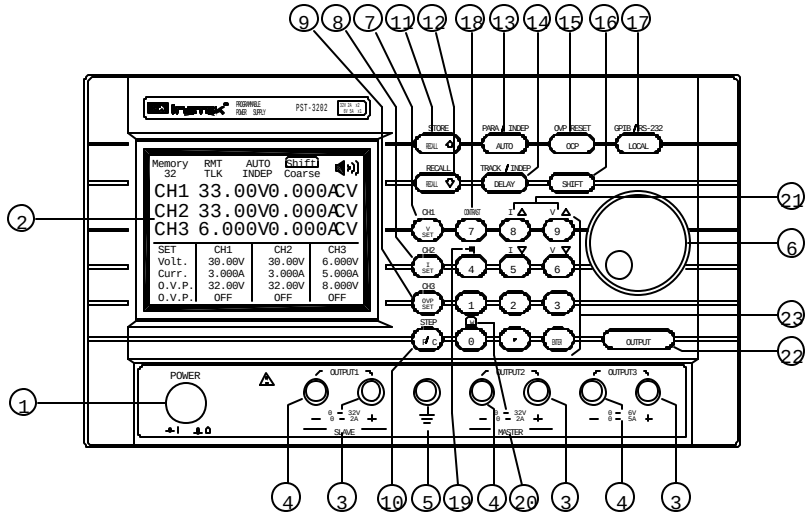

Figure 4-1 Front Panel

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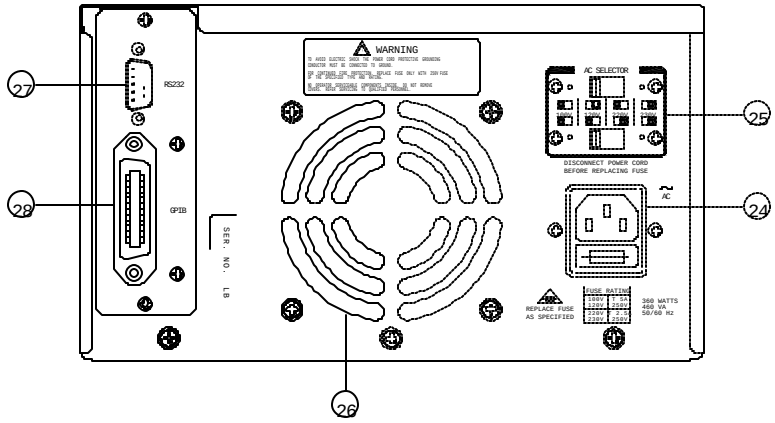

Figure 4-2 Rear Panel

1.	Power Switch	Connect the AC power, then press power switch.
2.	Display	Indicate the setting of voltage/current value, output voltage/current value and the status of setting and output.
3.	+Output Terminal	Positive output terminal.
4.	-Output Terminal	Negative output terminal.
5.	GND Terminal	Connect the ground terminal to chassis.
6.	Rotary Encoder	Wheel knob.
7.	V Set (CH1)	Output voltage setting. Switch to channel 1 by pressing [SHIFT][CH1] to proceed group setting.
8.	I Set (CH2)	Output current setting. Switch to channel 2 by pressing [SHIFT][CH2] to proceed group setting.
9.	OVP Set (CH3)	Over voltage protection value setting. Switch to channel 3 by pressing [SHIFT][CH3] to proceed group setting.
10.	F/C (STEP)	Switch to wheel knob for coarse and fine adjustment. Proceed the STEP setting by pressing [SHIFT][STEP].
11.	Recall△ (Store)	Recall the next group of stored information. Proceed information storing and editing by pressing [SHIFT][STORE].
12.	Recall▽(Recall)	Recall previous stored information. Recall the pointed stored information or set the range to recall information automatically by pressing [SHIFT][RECALL].
13.	AUTO (PARA/INDEP)	Turn on/off automatic operation function by setting the AUTO on or off. Operate the instrument in the parallel mode by pressing [SHIFT][PARA] and back to independent mode by pressing the keys again.
14.	Delay (TRACK/INDEPT)	Set the voltage and current output time in the automatic operation m ode.

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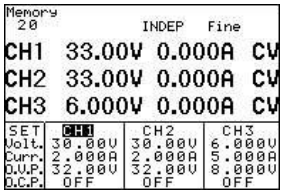
		Operate the instrument in the series mode by pressing [SHIFT][TRACK] and back to independent mode by pressing the keys again.
15.	OCP (OVP RESET)	Turn on/off the over current protection function by setting the OCP on or off. Release the over voltage protection mode by pressing [SHIFT][OVP RESET].
16.	SHIFT	The second function selection.
17.	Local (GPIB/RS-232)	Clear the remote control mode to use panel control setting instead. Set to GPIB or RS-232 by pressing [SHIFT][GPIB/RS-232].
18.	Contrast	Proceed the contrast adjustment of the display by pressing [SHIFT][CONTRAST].
19.	•)))	Set beeper by pressing [SHIFT][•)))] to turn on/off the buzzer.
20.	W	Press [SHIFT][W] to change the character size.
21.	I△	Under the status of [SHIFT], press I△ to ascend one step of current value for output.
	I▽	Under the status of [SHIFT], press I▽ to descend one step of current value for output..
	V△	Under the status of [SHIFT], press V△ to ascend one step of voltage value for output.
	V▽	Under the status of [SHIFT], press V▽ to descend one step of voltage value for output..
22.	Output	Turn on or off output by pressing the knob.
23.	0~9, " • ", ENTER	Value input.
24.	AC Power Socket	AC power input terminal.
25.	AC Select Switch	Switch Voltage to 100V, 120V, 220V or 230V, 50/60Hz.
26.	Cooling Fan	A cooling fan.
27 & 28	Interface	GPIB or RS-232C communication interface.

5. OPERATION METHOD

5-1. Output Voltage/Current Setting

At first, select the wanted channel by pressing [SHIFT][CHx], now the cursor is set to CHx (x=1, 2 or 3). Please refer to the drawing:



–Output Voltage Setting:

Method 1: Set output voltage by pressing [V SET] and using number key to key in [voltage value], then press [ENTER].

Method 2: Press [V SET] and using knob to input [voltage value], the output voltage setting will be changed immediately, then press [ENTER] to terminate the voltage setting. Obviously, using this method, the output voltage will be changed immediately following the input value through knob.

Example: Set voltage at 32.00V.
Press [V SET][3][2][.][0][0][ENTER]

–Output Current Setting:

Method 1: Set output current by pressing [I SET] and using number key to key in [current value], and [ENTER].

Method 2: Press [I SET] and using knob to input [current value], the output current setting will be changed immediately, then press [ENTER] to terminate the current setting. Obviously, using this method, the output current will be changed immediately following the input value through knob.

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Example: Set current at 1.000A.
Press [I SET][1][.][0][0][0][ENTER]
When the load current through output terminal exceeds the setting value, the instrument is operated in the C.C. mode, if not exceeds the setting value, the instrument is operated in the C.V. mode.

5-2.Over Voltage /Current Protection Setting

At first, select the wanted channel by pressing [SHIFT][CHx] now the cursor is set to CHx (x=1, 2 or 3).

–Over Voltage Protection Setting:

Method 1: Set OVP voltage level by pressing [OVP SET], and using number key to key in [voltage value], then press [ENTER].

Method 2: Press [OVP SET] and using knob to input [voltage value], the OVP voltage level setting will be changed immediately, then press [ENTER] to terminate the OVP voltage level setting. Obviously, using this method, the OVP voltage level will be changed immediately following the input value through knob.

Example: Set OVP voltage at 33.00V.
Press [OVP SET][3][3][.][0][0][ENTER]

–OVP Status Clear Up:

When the output voltage exceeds 33.00V of the setting voltage, the output of the instrument will be off and get into OVP mode by displaying "Over Voltage Protection…" on the panel. Now press [SHIFT][OVP RESET] to clear OVP status, back to previous status.

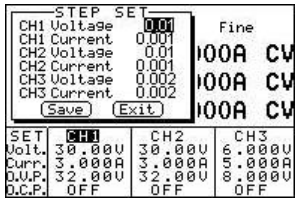
–Over Current Protection Setting:

Turn on/off the OCP of each channel individually by pressing [OCP]. If OCP is on, when the output current equals or exceeds

the current value setting, the output of the instrument will be off and get into over current protection mode by displaying "Over current protection" on the display. Press [OCP] to clear OCP status, and back to previous status.

5-3. Voltage/Current Step Setting:

Press [SHIFT][STEP] getting into the item selection picture, using the knob to set cursor to the setting item which you want to modify, input directly the wanted value and press [ENTER]. Store the setting by using the knob to move the cursor to [SAVE], then press [ENTER] again to complete the setting and storing. If want to cancel the setting, move the cursor to [EXIT] and [ENTER] with knob to terminate the setting without storing.



Example? Set the step voltage of Channel 1 at 1.00V and the step current at 0.10A.

Press [SHIFT][STEP], elect CH1 Voltage and input [1][.][0][0][ENTER], then select CH1 Current and input [0][.][1][0][0][ENTER]. Finally, using the knob to move the cursor to [SAVE] and press [ENTER] to complete the setting and storing.

Note: The setting of the Step voltage and Step current of CH1 CH2 CH3 can be proceeded at the same display window.

5-4.Information Storing and Recalling setting:

--Information Storing Setting:

Press [SHIFT][STORE] getting into item selection picture, using

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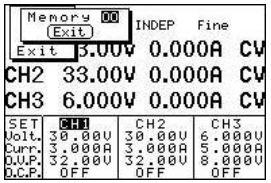
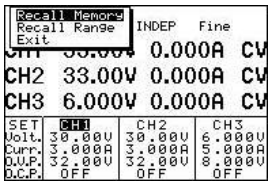
the knob to set cursor to [STORE] and press [ENTER] to appear memory storing picture, then using number key to key in store address and press [ENTER] to complete the setting and storing



Example? The current setting store address of instrument is at "00". Press [SHIFT][STORE] getting into item selection picture, using the knob to set the cursor to [STORE], then press [ENTER] and input [0][0][ENTER] directly to complete storing setting.

–Information Recalling Setting:

Press [SHIFT][RECALL] getting into item selection picture, using the knob to set the cursor to [Recall Memory], press [ENTER] to appear memory recalling picture, then input recalling address by using number key, press [ENTER]to complete recalling setting.



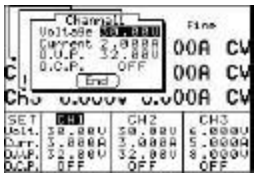
Example: Recall the storing address "00" to the current setting status of instrument.

Press [SHIFT][RECALL] getting into item selection picture, using the knob to set the cursor to Recall Memory. Press [ENTER] and input [0][0][ENTER] to complete recalling setting.

5-5.Information Editing and Copying Setting:

--Information Editing (Edit) Setting:

Press [SHIFT][STORE] getting into item selection picture, using the knob to set the cursor to [Edit], press [ENTER] to appear memory editing picture, then input editing address by using number key and press [ENTER] to appear editing selection picture, now, using the knob to set cursor to the editing item which wants to be modified its setting and input directly its setting value or on/off status by using the number key, press [ENTER] to proceed modification. After the modification is completed, set the cursor to [End] by using the knob and press [ENTER] to complete the setting. If want to proceed the other setting modification, just return to previous editing item picture and repeat above mentioned procedures. When the modification is completed, using the knob to set the cursor to [SAVE], press [ENTER] to complete information edit setting and storing. If want to cancel the setting, just set to [Exit] and press [ENTER] to terminate the setting without storing.



–Information Copy Setting:

Press [SHIFT][STORE] getting into item selection picture, select Copy, press [ENTER] getting into Copy setting picture, select the modified item and input copy address and press [ENTER]. After modification, select [Save], and press [ENTER] to complete the setting and storing. If want to cancel the setting, just set to [Exit] and press [ENTER] to terminate the setting without storing.

Note: Do not repeat the address of Source and Target input, also

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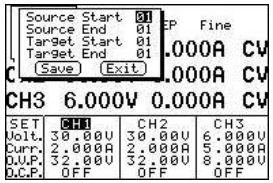
the value of End must be larger than Start's.

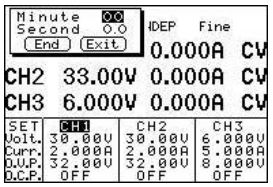


5-6. Auto-operation Mode

--Delay Time Setting:

Press [DELAY] getting into item selection picture, using the knob to set cursor to the wanted setting item and input the time directly by using number key, and press [ENTER]. Finally using the knob to set the cursor to [End] and press [ENTER] to complete the setting. The Delay Time setting has to be further stored in the specific place of the memory address according to the procedure of 5-4 Information Storing setting. Please note, when the storing procedure is proceeding, all the other settings of the instrument will be also stored in the same place of memory address.

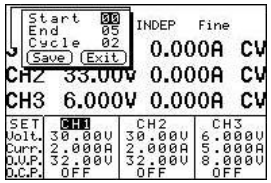
If want to cancel the setting, set the cursor to [Exit] by using the knob and press [ENTER] to terminate the setting without storing.



--Auto-operation

Press [SHIFT][RECALL] getting into item selection picture, using the knob to set cursor to recall range and press [ENTER] to appear the picture of auto operation setting, set the cursor to the item to be

modified by using the knob and using the number key to input [auto operation setting value] and press [ENTER]. After modification, using the knob to set the cursor to [Save], and press [ENTER] to complete the setting and storing. If want to cancel the setting, just set the cursor to [Exit] by using the knob and press [ENTER] to terminate the setting without storing.



Note: When input "00" repeatedly can select Cycle setting.

5-7. Parallel Operation Mode

Press [SHIFT][PARA] getting into parallel operation mode. In this mode, output voltage and current are mainly operated in channel 2. The settable range of output voltage is same as channel 2 while the settable range of output current is two times of channel 2.

Example:

(1) Channel 1: Voltage=10V, Current= 1A.
(2) Channel 2: Voltage=20V, Current= 2A.
(3) Press [SHIFT][PARA] getting into parallel mode.
(4) Output voltage=20V, output current=4A.

5-8. Track Operation Mode

Press [SHIFT][TRACK] getting into Track Operation Mode. In this mode, output voltage and current are mainly operated in channel 2. The settable range of output voltage is same as channel 2, but the output current can be set with different value.

Example?

(1) Channel 1: Voltage=10V, Current= 2A.

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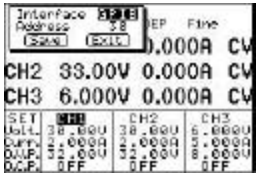
(2) Channel 2: Voltage=20V, Current= 2A.
(3) Press [SHIFT][TRACK] getting into track mode.
(4) Output voltage=40V, output current=2A

WARNING. Voltage more than 60V DC is a lethal shock hazard to the user. Be careful when connecting power supplies in series to achieve voltages higher than 60VDC totally or 60VDC between any connection and earth ground.

5-9.GPIB/RS232 Interface Setting

Press [SHIFT][GPIB/RS-232] getting into item selection picture, using the knob to set the cursor to Interface and press [ENTER] to appear interface selection picture, set the cursor to the item to be modified by using the knob and press [ENTER]. Then set the cursor to Address or Baud Rate setting area, if want to modify the address, directly using the number to input address setting value and press [ENTER], if want to modify the Baud Rate, first press [ENTER], then using the knob to set the cursor to the setting value to be modified and press [ENTER]. Finally set the cursor to [Save] by using the knob and press [ENTER] to complete the setting and storing. If want to cancel the setting, set the cursor to [Exit] by using the knob and press [ENTER] to terminate the setting without storing.



Example:

1) Set GPIB as communication interface, and set address at [10]. Press [SHIFT][GPIB/RS-232] getting into item selection picture, using the knob to set the cursor to interface and press [ENTER] to appear interface selection picture, using the knob to set the cursor to GPIB, press [ENTER]. Then using the knob to set the cursor to address and input address setting value directly by using the number key and press [ENTER]. Finally set the cursor to [Save] by using the knob and press [ENTER] to complete the setting and storing.

2) Set RS-232 as communication interface, and Baud Rate at 9600.
Press [SHIFT][GPIB/RS-232] getting into item selection picture, using the knob to set the cursor to interface and press [ENTER] to appear interface selection picture, set the cursor to RS-232 by using the knob and press [ENTER]. After using the knob to set the cursor to [Baud Rate] by using the knob and press [ENTER], set the cursor to [9600] and press [ENTER]. Finally set the cursor to [Save] and press [ENTER] to complete the setting and storing.

5-10. The Maximum Setting Value

MODEL / ITEM	PST-3201			PST-3202		
	CH1	CH2	CH3	CH1	CH2	CH3
Output Voltage	33V	33V	33V	33V	33V	7V
Output Current	1.1A	1.1A	1.1A	2.1A	2.1A	5.2A
Over-voltage	34V	34V	34V	34V	34V	8V
Step Voltage	10V	10V	10V	10V	10V	1V
Step Current	0.5A	0.5A	0.5A	1A	1A	2.5A
Delay Time	99' 59"			99' 59"		
Memory Group	100			100		

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5-11.Test Lead

MODEL / ITEM	PST-3201			PST-3202		
	CH1	CH2	CH3	CH1	CH2	CH3
	(3A) Test Lead	(3A) Test Lead	(3A) Test Lead	(3A) Test Lead	(3A) Test Lead	(4A-10A) Test Lead

Note: When use PST-3202 in parallel output, needs to use (Current 4A-10A) test lead.

5-12. The setting for the GPIB and RS232 Interface

If you have PST-series programmable power supply, use the GPIB-RS232/LOCAL control to set or read the GPIB and RS-232 interface, please refer to the PST-series Programmer Manual for more details.

6. MAINTENANCE

WARNING

The following instructions are executed by qualified personnel only. To avoid electrical shock, do no perform any servicing other than the operating instructions unless you are qualified to do so.

Warning: Do not remove covers. Refer servicing to qualified personnel.

AVERTISS: Ne pas enlever le capot. Seul un personnel habilité peut intervenir sur le matériel.

Warning: No operator serviceable components inside.

AVERTISS:Pas de maintenance sur les composants internes.

6-1.Fuse Replacement

If the fuse blows, the display will not light and the power supply will not operate. The fuse should not normally open unless a problem has developed in the unit. Try to determine and correct the cause of the blown fuse, then replace only with a fuse of the correct rating and type (refer to 3-2 of page 5). The fuse is located on the rear panel (see Fig.4-2).

WARNING. For continued fire protection. Replace fuse only with 250V fuse of the specific type and rating, and disconnect power cord before replacing fuse.

AVERTISS: Pour une protection contre les risques d' incendie, remplacer le fusible exclusivement par un modèle aux caractéristiques équivalentes.

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6-2. Line Voltage Conversion

The primary winding of the power transformer is tapped to permit operation from 100, 120, 220, or 230VAC, 50/60 Hz line voltage. Conversion from one line voltage to another is done by change AC selects switch.

The rear panel identifies the line voltage to which the unit was factory set. To convert to a different line voltage, perform the following procedure:

(1) Make sure the power cord is unplugged.

(2) Change the AC selects switch to the desired line voltage position.

(3) A change in line voltage may also require a corresponding change of fuse value. Install the correct fuse value as listed on rear panel.

6-3. ADJUSTMENT AND CALIBRATION

–Preparation

1. 30 minutes warm up before calibration.

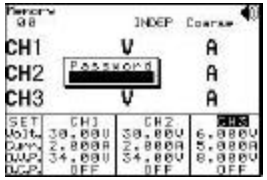
2. Ambient temperature:23 ±5°C, Humidity: Under PH80%.

–Output Calibration Steps:

[Step 1]

Press [SHIFT][•] to appear Password input window , input Password (vary with different models: PST-3202: 3202, PST -3201: 3201) by using the number key, press [ENTER] key. When the value has been

input by mistake, but not yet pressed [ENTER], can use the knob to clear the input value.



[Step 2]

When get into Calibrated item selection window, set the cursor to the calibrated item by using the knob and press [ENTER]. After the calibrated item is selected, proceeding voltage, current and over-voltage calibration step by step.

[Step 3] Voltage Calibration Steps

After the channel is selected, set the cursor to [voltage] by using the knob and press [ENTER] getting into voltage calibration procedure.

[Step 3.1]

After the proper measured setting has been done according to the step displayed in the window, press again [ENTER] to get into voltage value input window.

[Step 3.2]

Input measured voltage value directly by using the number key, and press [ENTER] to complete the measured voltage (MIN) input (When the value has been input by mistake, but not yet pressed [ENTER], can use the knob to clear the value.)

Note: The DMM selected for the measurement must have the

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resolution of three digits of the decimal point at least (1mV). Also the input value is to take two digits of decimal point of effective value (10mV) and run off the rest.

[Step 3.3]

After the proper adjustment of measured value has been done according to the step displayed in the window, press [ENTER] to complete Maximum voltage adjustment. The DMM selected for the measurement must have the resolution of three digits of the decimal point at least (1mV).

Note: During the adjustment, the maximum distortion range of the measured value is at 0.005V.

[Step 4] Current Calibration Steps

Set the cursor to [Current] by using the knob and press [ENTER] getting into Current calibration procedure.

[Step 4.1]

After the proper measured setting has been done according to the step displayed by the window, press again [ENTER] to get into current (MAX.) value input window.

[Step 4.2]

Input measured current value directly by using the number key, and press [ENTER] to complete the measured current (MAX) input (When the value has been input by mistake, but not yet pressed [ENTER], can

use the knob to clear the value.)

Note: The DMM selected for the measurement must have the resolution of four digits of the decimal point at least (0.1mA). Also the input value is to take three digits of decimal point of effective value (1mA) and run off the rest.

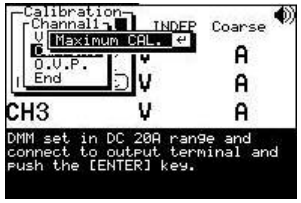
[Step 4.3]

Press again [ENTER] getting into the window for current calibrated value input.

[Step 4.4]

Input measured current value directly by using the number key, and press [ENTER] to complete the measured current (MIN) input (When the value has been input by mistake, but not yet pressed [ENTER], can use the knob to clear the value.)

Note: The DMM selected for the measurement must have the resolution of four digits of the decimal point at least (0.1mA). Also the input value is to take three digits of decimal point of effective value (1mA) and run off the rest.



[Step 5]

Set the cursor to [O.V.P.] by using the knob and press [ENTER] getting into Over Voltage Protection auto-calibration procedure.

[Step 5.1]

After the O.V.P. auto-calibration is completed, set the cursor by using

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the knob to [END] and press [ENTER] to leave.

Note: Now, the calibrated data of channel 1 has not yet been stored. If the calibration is aimed at channel 1 only, can set the cursor to [Save] by using the knob and press [ENTER] to finish the procedure with storing.

If want to cancel the calibration, using the knob to set the cursor to [EXIT] and press [ENTER] to terminate the procedure without storing.

The calibration procedure as mentioned above can be aimed at channel 2 and channel 3 only.

[Step 6]

Repeat above calibration steps on channel 2 and channel 3.

[Step 7] Parallel Calibration steps

Set the cursor to [parallel] by using the knob and press [ENTER] getting into parallel current calibration procedure.

[Step 7.1]

After the proper measured setting has been done according to the steps displayed by the window, press again [ENTER] to get into the operand procedure of parallel current calibrated value.

[Step 7.2]

After the operand procedure of Parallel current calibration value has been completed and the proper measured setting has been done according to the steps displayed in the window, press [ENTER] to get into the window for Parallel Current (MAX.) calibrated value input.

[Step 7.3]

Input Parallel current measured value directly by using the number key, and press [ENTER] to complete the Parallel current (MAX) measured value input (When the value has been input by mistake, but not yet pressed [ENTER], can use the knob to clear the value.)

Note: The DMM selected for the measurement must have the resolution of four digits of the decimal point at least (0.1mA). Also the input value is to take three digits of decimal point of effective value (1mA) and run off the rest.

[Step 7.4]

Press again [ENTER] getting into the window for Parallel current calibrated value input.

[Step 7.5]

Input Parallel current measured value directly by using the number key, and press [ENTER] to complete the Parallel current (MIN) measured value input (When the value has been input by mistake, but not yet pressed [ENTER], can use the knob to clear the value.)

Note: The DMM selected for the measurement must have the resolution of four digits of the decimal point at least (0.1mA). Also the input value is to take three digits of decimal point of effective value (1mA) and run off the rest.

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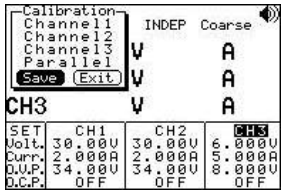
[Step 8]

Set the cursor to [Save] by using the knob and press [ENTER] to terminate the calibration with storing. If want to cancel the calibration, using the knob to set the cursor to [EXIT] and press [ENTER] to terminate the procedure without storing.

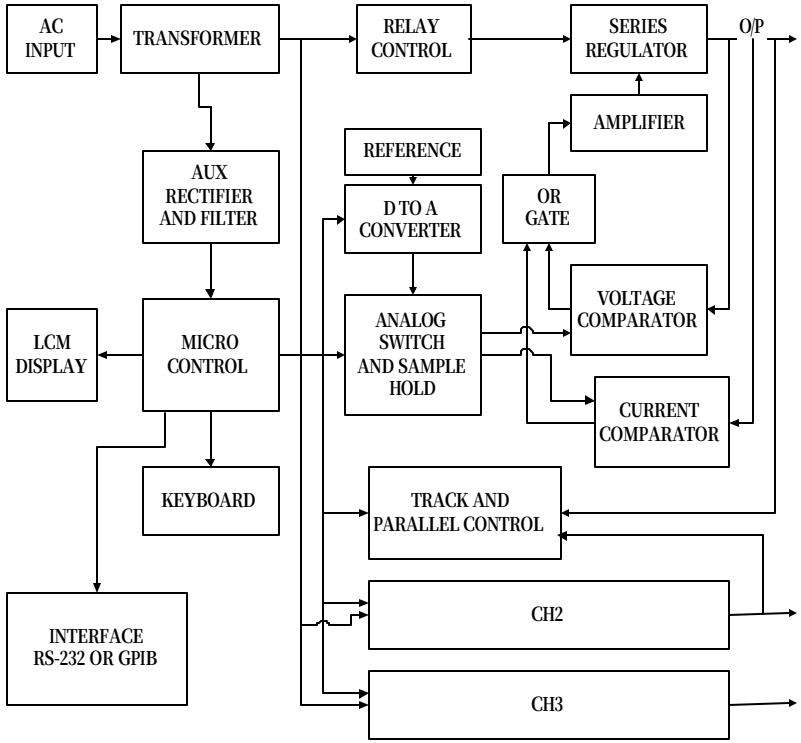


6-4. Cleaning

To clean the power supply, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage. Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents. Do not use abrasive cleaners on any portion of the instrument.

7. THE SYSTEM DIAGRAM AND DESCRIPTION

7-1. Block Diagram



The graph above is the system diagram of PST -SERIES, Which consists of Micro Processor Unit (MPU), Digital to Analog Converter (DAC), Analog Switch Circuit, Reference Voltage Circuit, Driver Circuit, Control Circuit, Track/Parallel Circuit, Comparator, and etc.

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7-2.The Operation of the whole circuit

Each output channel of PST-series has a reference voltage circuit at around 2.5V output voltage which can be amplified to 2.5 (1+R314 /(R315+Vr))=2.5(1+12.4K/(7.68K+Vr)) by a non-inverter amplifier. When Vr=0~500, take its middle value to convert above formula into 6.41V, and treat this as the reference voltage of DAC AD7541. The AD7541 is a 12-bit DAC with 6.41V/4095=1.56mV/bit of the resolution.

C.V. Mode

When the instrument is in C.V. Mode, the MPU will send 3300 counts, 33.00V of output voltage, to DAC, output through analog switch and Sample Hold circuit, the voltage now is at around -5.148V(-1.56mVx3300=-5.148V). Then, compare this voltage with the real output voltage which is retrieved by the voltage sense circuit. As the entire circuit is a close loop, therefore, the retrieved voltage value will be followed with the reference voltage of Sample Hold. Besides, the Comparator output terminal will output a relative voltage value to control the whole output circuit through a driver circuit? and generate the required output voltage. The attenuation of the voltage sense circuit is A=R342/(R342+R335)=4.99K/(4.99K+27.0K) =0.156, and the output voltage is Vout=5.148/A=5.148/0.156=33.00V? If the output is affected by the offset of materials, can use the Vr to make adequate adjustment.

C.C. Mode

The operation in C.C. Mode is similar to that in C.V. Mode. The MPU will send 2100 counts, 2.1A output current, to DAC, output through analog switch and Sample Hold circuit, the voltage now is at around -3.276V (-1.56mVx2100=-3.276V). Then, compare this voltage with the real output voltage which is retrieved by the current sense circuit. As the entire circuit is a close loop, therefore, the retrieved voltage value will be followed with the reference voltage of Sample Hold. Besides, the Comparator output terminal will output a relative voltage value to control the whole output circuit through a driver circuit? and generate the required output voltage. The current sense circuit for detecting the voltage value from current sense resistor is mainly composed by differential amplifier TL071. The multiple of the differential amplifier is A=-R355/R356=-22.0K/1.91K=-11.518, the voltage on the both sides of current sense resistor is -3.276/-11.518=0.285V, so the output current is basis on Iout=(0.285/R374)*2=(0.285/0.3)*2=1.9A, and 2.1A making multiple operand to get a real output current by using the software.

The Displayed Value of Voltage and Current

The voltage/current sense circuit retrieves a voltage value which will be sent to Comparator through Analog Switch, and joined with the output voltage of DAC in dichotomy approaching method to get the same voltage as the real output value of the instrument.

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